

*STRATEGIES TO INCREASE EXERCISE-REPORT CORRESPONDENCE
BY BOYS WITH MODERATE MENTAL RETARDATION:
COLLATERAL CHANGES IN INTENTION-EXERCISE CORRESPONDENCE*

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Correspondence between verbal and nonverbal behavior in an exercise room was taught to 4 13-year-old boys diagnosed with moderate mental retardation. Participants were asked prior to each exercise session which exercise machine(s) they intended to use. No contingencies on stating intentions (promising) were applied. Following the exercise session, participants were asked to say (report) which machine(s) they had used. Following the baseline condition, do-report correspondence training was introduced sequentially across participants. During do-report correspondence training, accurate reporting was reinforced. High rates of both do-report and promise-do correspondence were observed. Data were analyzed via a multiple baseline across subjects design and contingency-space analysis. Results are discussed with regard to observed changes in promise-do correspondence subsequent to observed changes in do-report correspondence.

DESCRIPTORS: correspondence training, mental retardation, exercise, adolescents

Verbal-nonverbal correspondence has been the topic of increasing attention over the past decade (Baer, 1990). In correspondence training, individuals make verbal statements or promises about their future behavior or report their past behavior. To establish correspondence, the match between verbal and nonverbal behavior is reinforced (Guevremont, Osnes, & Stokes, 1986a, 1986b; Stokes, Osnes, & Guevremont, 1987).

Some previously reported investigations of correspondence training may have inadvertently imposed escape contingencies on subject verbalizations by requiring subjects to make promises regarding their future behavior in settings containing potentially reinforcing stimuli (e.g., food, toys, free play) prior to gaining entry to those environments (cf. Baer & Detrich, 1990). In other investigations of correspondence training, experimenter-determined statements regarding future behavior were prompted and, in some cases, reinforced (e.g., Baer, Osnes, & Stokes, 1984; Baer, Williams, Osnes, & Stokes, 1985; Crouch, Rusch, & Karlan, 1984). In such

studies it is not possible to determine whether separate reinforcement contingencies controlled subjects' verbal and nonverbal behavior, or if their verbal statements exerted discriminative control over future nonverbal behavior. In the current study, neither escape nor reinforcement contingencies were provided for promising (or not promising) or for the content of promises.

An important objective of special education programs is to provide normalized educational experiences in integrated settings for students with special needs. It has been suggested that physical education settings may represent opportunities to provide integrated experiences because differences in abilities between students with special needs and their nondisabled peers may be minimized (Moon & Renzaglia, 1982; Polloway & Smith, 1978; Rarick, Widdop, & Broadhead, 1970). In the current study, 4 students with moderate mental retardation participated in a weight training program in a local community recreation facility.

The purpose of this study was twofold. First, we attempted to determine whether adolescents with moderate mental retardation and severe language deficits could accurately report their exercise behavior following "do-report" correspondence training. We also sought to investigate whether collateral changes in "promise-do" correspondence would accrue following acquisition of accurate reporting.

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METHOD

Participants and Setting

Participants. Participants were 4 13-year-old boys (Seth, Steve, Charles, and Jack) who attended summer school in a self-contained special education classroom. Educational goals for participants included the following skills: communication, social, leisure, vocational, and mobility skills and functional academics. Participants' mean IQ score was 45 (range, 41 to 49), their mean Vineland raw score was 52 (range, 31 to 70), and their average Peabody Picture Vocabulary Test (Form L) raw score was 59 (range, 37 to 70). Finally, subjects' expressive language was assessed by calculating their mean length of utterance on approximately 75 language samples. Results of this analysis yielded an overall mean of 2.75 (range, 2.1 to 3.5). Scores in this range are typical of normally developing children between the ages of 2 and 3 years.

Setting. All training and assessment occurred in a weight training room at a recreation center in a medium-sized midwestern city. The weight room was divided into three areas: (a) a dance floor (approximately 15 m by 15 m), (b) a free weight area (approximately 5 m by 5 m), and (c) a universal weight machine area (approximately 5 m by 5 m). Seven exercise machines were available, including a rowing machine, a pull-down bar, a leg machine, sit-up board, a bench press, a stationary bike, and a military press.

Target Behaviors and Assessment

Procedures

Use of exercise machines. Use of exercise machines was the target behavior. Rather than specifically targeting proper use of each machine, the teacher and classroom aides provided informal instruction after students initiated use of a machine. To be considered an occurrence of exercise machine use, three conditions had to be met: (a) Use was not prompted, (b) operationally defined performance criteria were met, and (c) use began within 30 s of the onset of the opportunity to exercise.

Correspondence. Promise-do and do-report correspondence were assessed (Karlson & Rusch, 1982). *Promise-do correspondence* was defined as agree-

ment between a student's indication that he would use a machine (promise) and his actual machine use (do) during the exercise session. *Do-report correspondence* was defined as agreement between the machines used during the student's workout (do) and what he said he did (report) during each session.

To assess promise-do correspondence, the first author asked each student individually prior to the workout which four machines he intended to use to complete his workout. Observers recorded the name of the first four machines the student named, touched, or pointed to. If a student failed to select a machine within 10 s of being asked, the question (i.e., "Which four machines will you use today?") was repeated up to a total of three times, or until four machines had been selected.

Do-report correspondence data were collected by the teacher and her aide. To assess do-report correspondence, the teacher was given an index card for each student listing the machines he had used during his workout. Following the workout each day, the teacher asked the student to indicate which machines he had used during the workout. Observers recorded the name of the first four machines the student named, touched, or pointed to. If the student did not report anything within 10 s, observers scored a nonreport. The teacher continued to ask the student what he did during his workout until a total of four reports or nonreports were obtained.

Interobserver Agreement

Two independent observers recorded student target responses concurrently. Agreement for all measures was assessed for each student at least once per week throughout the study. Agreement data were collected during 33% of baseline and 29% of experimental sessions. Occurrence agreement was calculated for use of exercise machines, promise-do correspondence, and do-report correspondence for each student by dividing the number of agreements on each occurrence of the target event by the number of agreements plus disagreements multiplied by 100%. Percentage agreement for occurrences of machine use averaged 96% (range, 91% to 100%) across all machines. Agreement on promise-do cor-

respondence averaged 99% (range, 75% to 100%) and agreement of do-report correspondence averaged 99% (range, 75% to 100%).

Measurement of exercise machine use. Data on the use of exercise machines were collected by the first author and an undergraduate student. Students' use of exercise machines was observed Monday through Friday during 30-min exercise sessions. Exercise sessions consisted of four 4.5-min periods during which students were given the opportunity to use an exercise machine of their choice. Each 4.5-min period was followed by a 30-s interval that allowed students an opportunity to stop using one machine and move to another. During these intervals, observers recorded the name of the machine each student used on a card (7.5 cm by 13 cm) under the heading "Machines Used." If the student failed to use one of the available exercise machines, nothing was recorded for the interval.

Procedures

Correspondence training was introduced sequentially across students within a multiple baseline design. Each student participated within a multiple baseline design. Each student participated in baseline, 1 day of correspondence training, and reinforcement of accurate reports in all subsequent sessions.

The participants' ability to report their behavior accurately was assessed prior to the study. Each student was observed performing four or five consecutive familiar activities in the context of his normal school day (e.g., wiping a table, throwing away a towel, turning on a radio, eating a snack). Students were then asked to report the activity just performed. No prompts or reinforcers were delivered during assessments. Participants accurately reported an average of 83% (range, 75% to 92%) of observed behaviors. Based on these data, we concluded that all participants were generally able to report their behavior accurately when no experimenter prompts or experimenter-arranged reinforcement contingencies were in effect.

During all baseline and experimental sessions, the teacher and aides accompanied students to the recreation center's locker room and then went to a dance floor adjacent to the weight training area to

perform stretching and warm-up exercises prior to actual weight training. Immediately before the exercise sessions, the first author accompanied each student individually to the weight machines and said, "It's time to exercise. To complete your workout, you need to use four machines. Which four machines will you use today?" Observers recorded each student's responses. Throughout the study, no consequences were arranged for students stating their choices. The teacher and aides were not informed of students' choices. In addition, to minimize possible modeling effects, students were individually asked to select the machines they would use during their workout while their peers were engaged in warm-up exercises.

After each student was asked to select the machines he would use in the workout, the entire group went to the weight training area. The first author said to the group, "It's time to do your workout. Remember to stop using the machine you are on when the beeper sounds." The first author then started a timer set for 4.5 min. During the first 30 s, observers recorded the first machine each student used. Throughout the study, if a student did not initiate machine use during an exercise interval, he was not prompted to do so. However, the teacher and aides were instructed to prevent students from initiating use of a second machine during the same exercise interval. At the end of each of the 4.5-min exercise intervals, a beeper sounded to signal the end of the exercise period.

Following the exercise session, students returned to the dance floor area to perform cool-down exercises. The observer gave the teacher the index cards listing the machines each student had used during the exercise session. The teacher then returned with students individually to the weight training area and asked each student, "What did you do in your workout today?" If the student named, touched, or pointed to a machine listed on the index card, the teacher marked a plus (+) for that machine. If the student named, touched, or pointed to a machine not listed on the index card, the teacher wrote the name of the machine on the index card and recorded a minus (−) next to it. If the student did not report anything within 10 s of being asked, the teacher reported a nonreport

and repeated the question. This procedure was continued until a total of four reports or nonreports was obtained. Consequences were delivered in accordance with the experimental phase described below.

Baseline. Prior to correspondence training, baseline data were collected using the procedures described above. No consequences were arranged for stating choices or accurately reporting behavior.

Correspondence training. Following baseline, the teacher provided each student individually with a rationale for the use of verbal correspondence and a demonstration of promise-do and do-report procedures. The teacher explained that adhering to correspondence procedures would allow the individual to select and use four weight machines to complete workouts. A second trainer (the experimenter) demonstrated several instances of correct promise-do and correct and incorrect do-report correspondence. Specifically, the teacher instructed participants to watch and be ready to do what was being demonstrated. The teacher informed the second trainer that he should use four machines to complete his workout. Next, the teacher asked the second trainer to tell her (promise) which four machines he would use. After the second trainer promised to use four machines, the teacher instructed him to begin the workout and to remember to stop using machines when the "beeper sounds." The second trainer began his workout and the teacher arranged for the beeper to sound after 15 s on each machine. When the second trainer had used four machines, the teacher asked him to report which machines were used during the workout. To make the reinforcement contingencies clear, the second trainer reported accurately all but the third machine. The teacher reinforced accurate reports by saying, "That's right. You said you did ___ and you did!" When the second trainer inaccurately reported a machine, the teacher commented, "You didn't really use the ___, did you?" No feedback was delivered regarding the second trainer's promise-do correspondence. Following the modeling session, the teacher said to the student, "Now I want you to do your workout. To complete your workout you need to use four machines. Which four ma-

chines will you use today?" After the student promised to use four machines, the teacher reminded him to stop using machines when the beeper sounded.

Reinforce accurate reporting. Procedures in this phase were identical to baseline except that consequences were delivered contingent on accurate reporting. No feedback or reinforcement was delivered regarding promise-do correspondence throughout the study. When students accurately reported use of a machine, verbal praise was delivered (e.g., "That's right. You said you used the ___, and you did"). One student, Seth, also received coins, which he used to purchase a soft drink after the workout. Another student, Jack, earned small portions of cheese in combination with verbal praise for accurate reporting. When students reported inaccurately, the teacher said, "You didn't really use the ___, did you?"

Contingency-Space Analysis

A contingency-space analysis (Matthews, Shimmoff, & Catania, 1987) was conducted to ascertain whether changes in the proportion of verbal-nonverbal correspondence could be attributed to the treatment. Matthews *et al.* suggested that verbal-nonverbal correspondence is appropriately analyzed by employing contingency spaces to describe the probability of one event given or not given another event.

Table 1 describes three relationships that may be formed when examining verbal-nonverbal correspondence (Karlan & Rusch, 1982). As illustrated, correspondence can occur under two sets of conditions: (a) A person performs a response (+) and states that he will or did perform the response (+), or (b) a person does not perform a response (-) and he states he will or did not perform the response (-). In both cases, affirmative or negative verbalizations correspond with nonverbal behavior. Alternatively, noncorrespondence may occur when a person does not perform a response (-) and states he will or did perform the response (+).

To perform the contingency-space analysis, all data were entered into the matrix depicted in Table 1. For each subject, the frequency of instances of

Table 1
Verbal Correspondence between Saying and Doing

		Saying (+)	Not saying (-)
Doing	(+)	(+) (+) Correspondence	(+) (-) Noncorrespondence by implication
Not doing	(-)	(-) (+) Noncorrespondence	Null

each of the various verbal–nonverbal relationships was noted for promise–do and for do–report in both baseline and reinforcement of accurate reporting conditions. Occurrences of both promise–do and promise not–do not were entered in the correspondence cell of Table 1. Percentages were computed for each relationship by dividing the number of occurrences of specific verbal–nonverbal relationships by the total number of opportunities for formation of verbal–nonverbal relationships.

RESULTS

Figure 1 presents the percentage of participants' promise–do and do–report correspondence during baseline and reinforcement of accurate reporting conditions. During baseline, Seth, Charles, and Jack achieved low levels of promise–do (combined $M = 13\%$; range of means, 0% to 25%) and do–report (combined $M = 19\%$; range of means, 10% to 25%) correspondence, whereas Steve displayed moderate levels of promise–do ($M = 39\%$) and do–report ($M = 39\%$) correspondence. Following a single training session, all participants subsequently exhibited high levels of both promise–do (overall $M = 90\%$; range of means, 67% to 98%) and do–report (overall $M = 93\%$; range of means, 64% to 96%) correspondence.

Contingency-Space Analysis

Table 2 presents the percentage of congruence between promising and doing exhibited by participants. Three types of promise–do correspondence were calculated for baseline and reinforcement of accurate reporting conditions, respectively: (a) *correspondence*, (b) *noncorrespondence by implica-*

tion, and (c) *noncorrespondence*. *Correspondence* included occurrences of promising (+) and subsequently doing (+). No instances occurred in which a participant indicated he would not use a particular machine when asked which machines he would use in his workout. *Noncorrespondence by implication* included instances of not promising (-) followed by doing (+) (e.g., a participant used a machine that he did not indicate he would use). *Noncorrespondence* included instances of promising (+) and subsequently not doing (-). When a participant had indicated the four machines he would use, it was assumed he had implicitly promised not to use any of the other machines.

As illustrated in Table 2, during baseline the overall percentage of correspondence averaged 20% (range of means, 0% to 39%). When combined, promise–do noncorrespondence by implication and noncorrespondence percentages averaged 80% (range of means, 61% to 100%) during baseline. The overall percentage of instances of noncorrespondence by implication [not promising (-) and subsequently doing (+)] was 21% (range of means, 3% to 54%). The overall percentage of instances of promise–do noncorrespondence (promising but subsequently not doing) was 55% (range of means, 23% to 94%).

During reinforcement of accurate reporting, the overall percentage of correspondence increased to an average of 75% (range of means, 56% to 96%). The combined promise–do noncorrespondence by implication and noncorrespondence average decreased to 25% (range of means, 4% to 44%). The overall percentage of instances of noncorrespondence by implication was 8% (range of means, 0% to 13%). The overall percentage of instances of

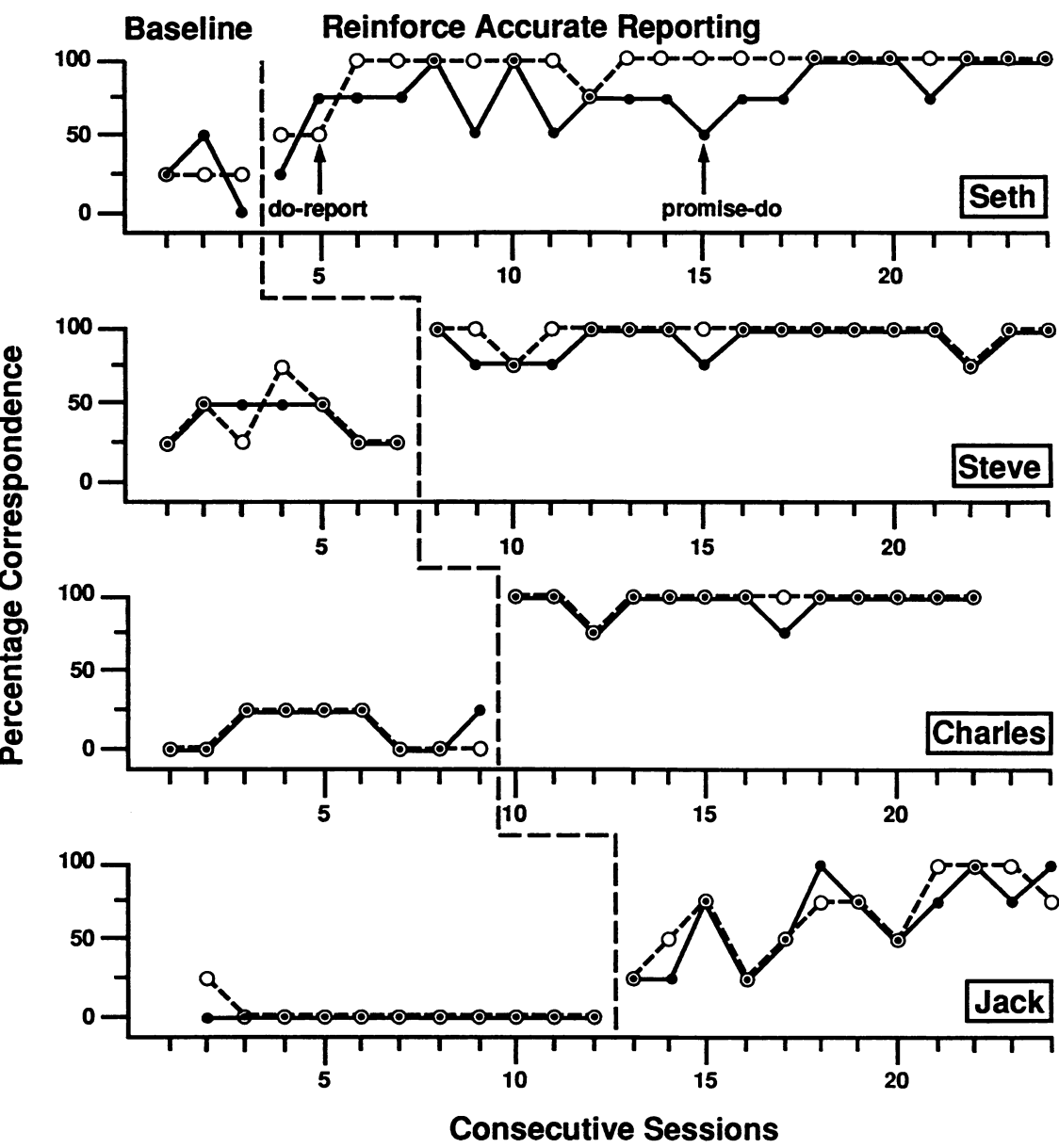


Figure 1. The percentage of “do-report” (reporting) correspondence (open circles) and the percentage of “promise-do” (promising) correspondence (closed circles) during baseline and reinforcement of accurate reporting for 4 subjects.

promise-do noncorrespondence was 17% (range of means, 4% to 33%).

Table 3 displays the percentages of do-report correspondence, noncorrespondence by implication, and noncorrespondence calculated for baseline and reinforcement of accurate reporting conditions, respectively, for each participant. Correspondence included occurrences of reporting (+) after doing

(+) (e.g., a participant accurately reported machine use) and reporting not using a machine (–) after not using it (–) (i.e., a participant accurately reported that he did not use a machine). Noncorrespondence by implication included instances of not reporting (–) after doing (+) (e.g., a participant did not report having used a machine subsequent to its use). Noncorrespondence included

Table 2
Say-Do Correspondence: Percentage of Correspondence between Promising and Doing

		Baseline	Reinforce accurate reports
Seth	<i>p</i> (do/say)	23	64
	Combined noncorrespondence	77	36
	<i>p</i> (do/not say)	54	13
	<i>p</i> (not do/say)	23	23
Steve	<i>p</i> (do/say)	39	39
	Combined noncorrespondence	61	16
	<i>p</i> (do/not say)	22	8
	<i>p</i> (not do/say)	39	8
Charles	<i>p</i> (do/say)	17	96
	Combined noncorrespondence	83	4
	<i>p</i> (do/not say)	93	0
	<i>p</i> (not do/say)	80	4
Jack	<i>p</i> (do/say)	0	56
	Combined noncorrespondence	100	44
	<i>p</i> (do/not say)	6	11
	<i>p</i> (not do/say)	94	33
Mean	<i>p</i> (do/say)	20	75
	Combined noncorrespondence	80	25
	<i>p</i> (do/not say)	21	8
	<i>p</i> (not do/say)	55	17

instances of reporting (+) after not doing (–) (e.g., a participant reported using a machine that he did not use).

As displayed in Table 3, during baseline the overall percentage of do-report correspondence averaged 26% (range of means, 5% to 39%). The combined overall percentage of do-report noncorrespondence by implication and noncorrespondence averaged 74% (range of means, 61% to 95%) during baseline. The overall percentage of instances of noncorrespondence by implication was 21% (range of means, 5% to 33%). The overall percentage of instances of do-report noncorrespondence was 53% (range of means, 32% to 90%).

During reinforcement of accurate reporting, the overall percentage of correspondence rose to an average of 88% (range of means, 70% to 100%) and the combined percentage of do-report noncorrespondence by implication and noncorrespondence dropped to an average of 12% (range of means, 0% to 30%). The overall percentage of noncorrespondence by implication was 4% (range of means,

0% to 11%). The overall percentage of do-report noncorrespondence was 8% (range of means, 0% to 19%).

DISCUSSION

In the present investigation, a single training session of modeling plus rehearsal with feedback was used to introduce participants to the contingencies for accurate reporting of exercise machine use. The correspondence training package was implemented sequentially in a multiple baseline across subjects design. This study demonstrated that adolescents diagnosed with moderate mental retardation can be taught to report their past behavior accurately using simple positive reinforcement contingencies. We also found that, as participants became more accurate reporters of past behavior, their percentage of promise-do correspondence also increased. This relationship was observed despite the absence of reinforcement or feedback contingent on the occurrence or content of promising throughout

Table 3
Do-Say Correspondence: Percentage of Correspondence between Doing and Reporting

		Baseline	Reinforce accurate reports
Seth	<i>p</i> (do/say)	25	89
	Combined noncorrespondence	75	11
	<i>p</i> (do/not say)	33	6
	<i>p</i> (not do/say)	42	5
Steve	<i>p</i> (do/say)	39	94
	Combined noncorrespondence	61	6
	<i>p</i> (do/not say)	29	1
	<i>p</i> (not do/say)	32	5
Charles	<i>p</i> (do/say)	33	100
	Combined noncorrespondence	67	0
	<i>p</i> (do/not say)	17	0
	<i>p</i> (not do/say)	50	0
Jack	<i>p</i> (do/say)	5	70
	Combined noncorrespondence	95	30
	<i>p</i> (do/not say)	5	11
	<i>p</i> (not do/say)	90	19
Mean	<i>p</i> (do/say)	26	88
	Combined noncorrespondence	74	12
	<i>p</i> (do/not say)	21	4
	<i>p</i> (not do/say)	53	8

the study. A contingency-space analysis (Matthews et al., 1987) provided additional evidence that changes in verbal–nonverbal correspondence were attributable to the intervention package.

To our knowledge, the present investigation was the first in which subjects determined the content and the occurrence of verbalizations and the subsequent performance (or nonperformance) of associated nonverbal responses. As suggested by Baer and Detrich (1990), our procedures did not include explicit experimenter-controlled contingencies for either the occurrence or content of participant promises or subsequent exercising throughout the study. That is, positive reinforcement was not delivered contingent on the occurrence or content of promising or exercising. Anecdotal observations suggested that escape contingencies did not control participants’ verbalizations (i.e., participants had to be verbally prompted to leave the warm-up area and begin exercise throughout the study).

It is possible that the participants’ promises provided antecedent cues for their future use of exercise

machines. However, our experimental procedures included the following sequence of events: (a) the experimenter requested the participant to make promises, (b) the participant promised or did not promise, (c) there was an opportunity to fulfill promises (exercise), (d) the teacher requested reports of exercising, (e) the participant reported or did not report exercising, and (f) the teacher delivered consequences for accuracy of reports. This sequence did not rule out the possibility that observed increases in promise–do correspondence were a result of these separate events becoming discriminatively linked (i.e., a chained schedule). Future research, using appropriate experimental controls, should seek to determine whether the establishment of do-report correspondence produces generalized promise–do correspondence.

This study extends the work of Fowler and Baer (1981), in which preschoolers’ accurate reports of engaging in targeted social behaviors during experimental sessions held in the morning were reinforced at the end of the day. Their procedure

resulted in generalized performance of target behaviors during intervening time periods in which no reinforcement contingencies were in effect. Fowler and Baer (1981) concluded that indiscriminable contingencies may have led to adventitious reinforcement of target behaviors, thereby facilitating the observed response generalization. In our study, a chained schedule of reinforcement may have controlled both promise-do and do-report correspondence, because the training sequence could have made the response-reinforcer contingency indiscriminable for the students.

Two of the subjects, Steve and Charles, showed immediate increases in level of both say-do (promising) and do-say (reporting) verbal-nonverbal correspondence following the intervention. However, Seth and Jack acquired both types of correspondence more gradually. Although the source of these differences is unclear, we believe we can rule out deficits in their ability to report their behavior accurately. As Baer and Detrich (1990) suggested, prior to the study we assessed the subjects' ability to report accurately and found that all participants were approximately equally skilled in this area. Future research should attempt to identify variables that lead to differential rates of acquisition of verbal-nonverbal correspondence.

During reinforcement of accurate reporting, Seth, Steve, and Charles accurately reported to the teacher that they did not use various machines on several occasions, although there was no contingency for such verbal responding. Also, all 4 participants were observed touching or pointing to machines while concurrently stating that they did not intend to use that particular machine at various times throughout the study. These responses may have been attempts to earn additional reinforcement, reflecting some misunderstanding of the reinforcement contingencies. Future research on verbal-nonverbal correspondence training should focus on the processes used by individuals with severe language deficits to mediate their behavior verbally as well as the outcomes of such procedures. Documenting individual variations in the application of such strategies may result in more effective training procedures.

In summary, we found that adolescents with

moderate mental retardation and severe language deficits accurately reported their exercise behavior following exposure to a correspondence training package and subsequent reinforcement of accurate reporting. In addition, the percentage of truthful promise-do correspondence increased in relation to participants' accurate reporting without direct intervention. These findings were confirmed by both intrasubject and contingency-space analyses. Design limitations of the present study did not permit an experimental analysis of the observed relationship between accurate reporting and truthful promising. However, practical implications for promoting generalizations are suggested regardless of whether the relationship represents generalized responding or an artifact of indiscriminable contingencies.

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